

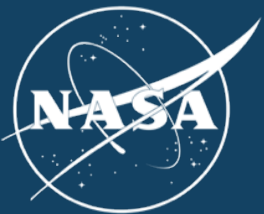
# REACT:

## Event Data Search and Use

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Ken Keiser

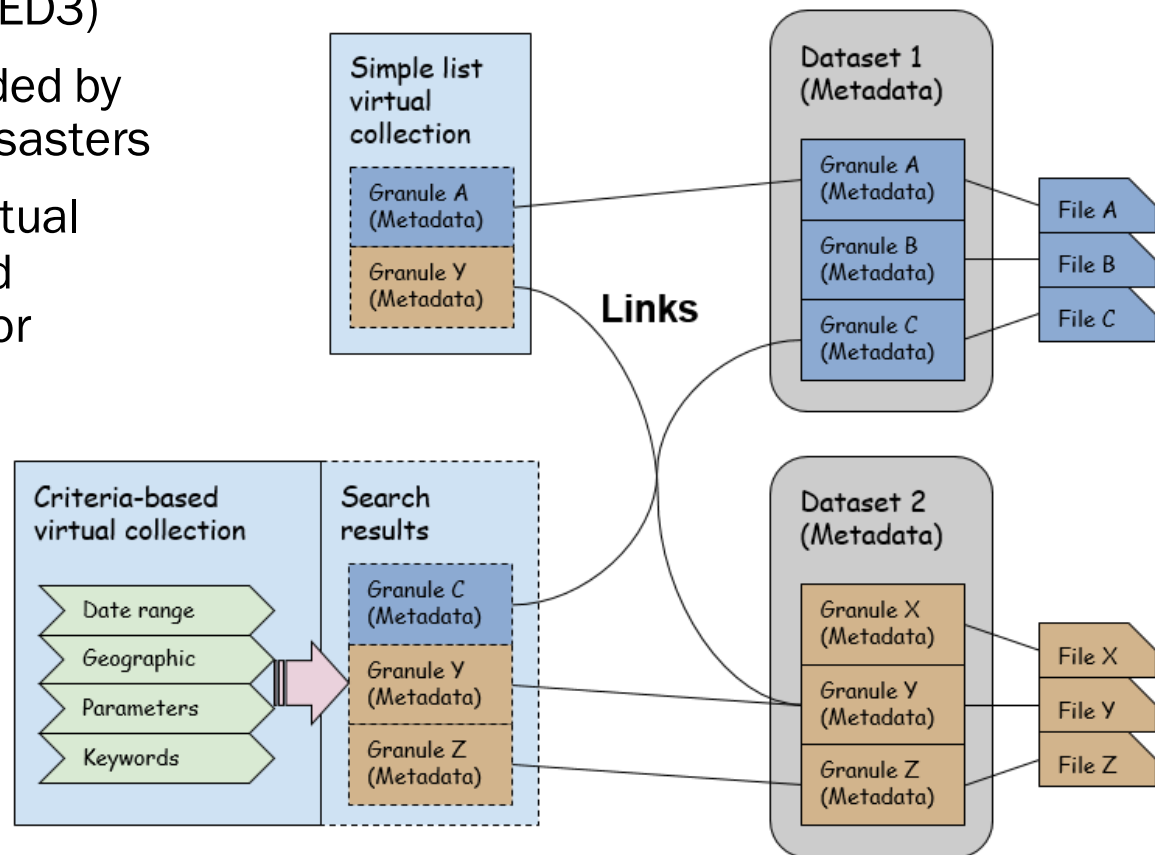
Deborah Smith

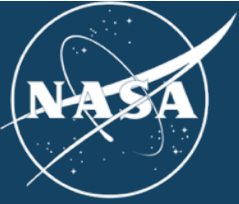




# ED3 Capability

- Event-Driven Data Delivery (ED3)
- ITSC technology project funded by NASA Applied Science for Disasters
- ED3 creates an album or virtual collection with user provided temporal, spatial, keyword, or parameter settings
- Process workflows created for collecting data details, and processing data if needed
- Web-based application on top of ED3 is called REACT





# REACT (Rapid Event Album CollecTions)



- Creating virtual collections of data for weather hazards or other events
- Resources collected via user defined subscriptions
- Can be a living collection with data added over time as it becomes available
- Can be a curated collection with data manually added or removed to make the collection more understandable, applicable or easy to communicate

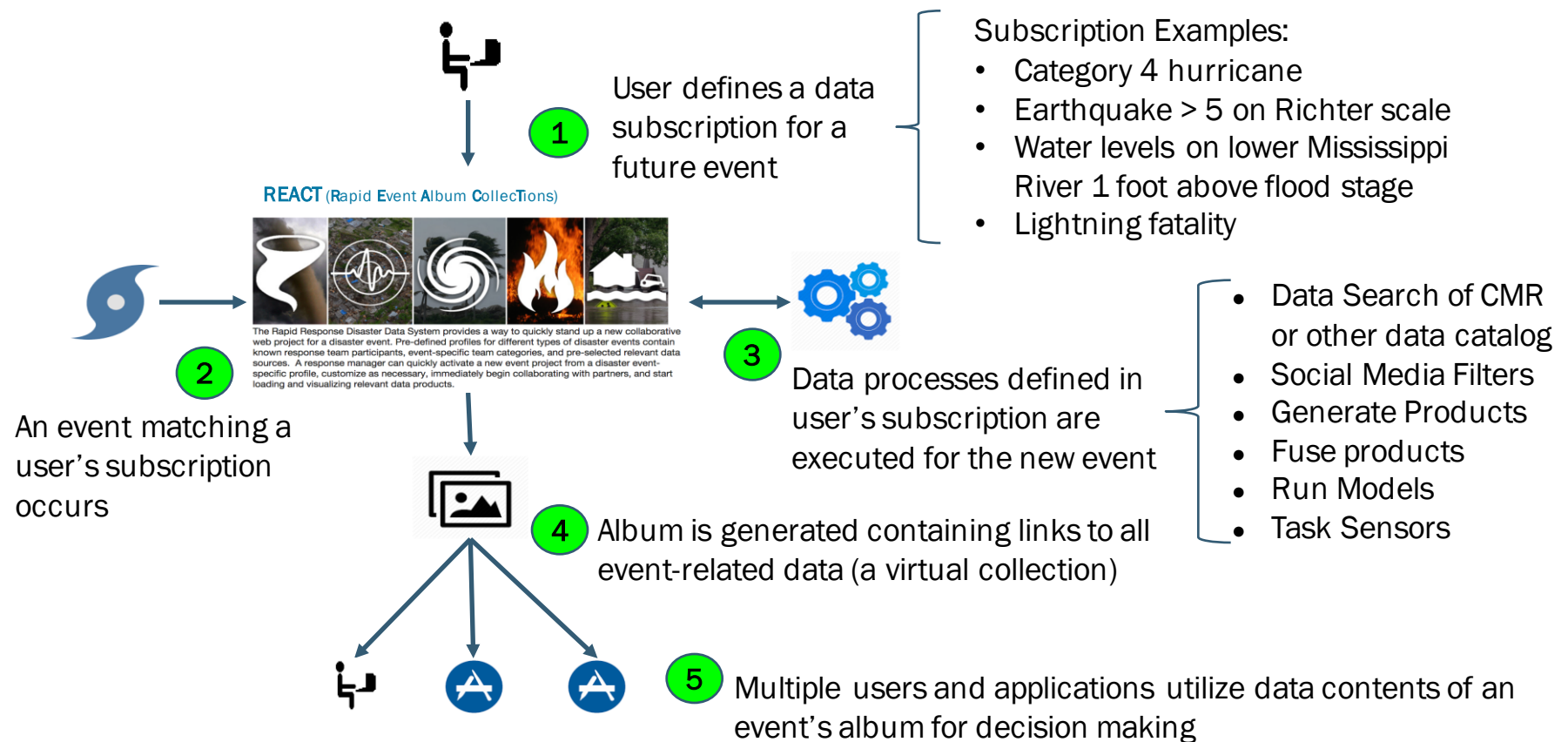
## REACT (Rapid Event Album CollecTions)



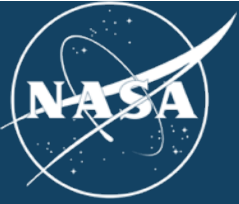
The Rapid Response Disaster Data System provides a way to quickly stand up a new collaborative web project for a disaster event. Pre-defined profiles for different types of disaster events contain known response team participants, event-specific team categories, and pre-selected relevant data sources. A response manager can quickly activate a new event project from a disaster event-specific profile, customize as necessary, immediately begin collaborating with partners, and start loading and visualizing relevant data products.



# User Workflow



Funded by NASA's Applied Science for Disasters Program



# Possible Future Capabilities



The application could allow enhanced subscription services for requesting album or virtual collection creation **in response to event occurrences**, with capability like:

- **Science data** resulting from spatial and temporal searches based on detected events of specified type, location and level (criteria)
- Generation of **new products** triggered by an event
- Output from event-triggered **model executions**
- Results from event-triggered **tasking of sensors**
- Results of other **data workflows**
- Gathering of information from selected **social networks**, including messages, videos, pictures, etc., relevant to event occurrence
- Other data...

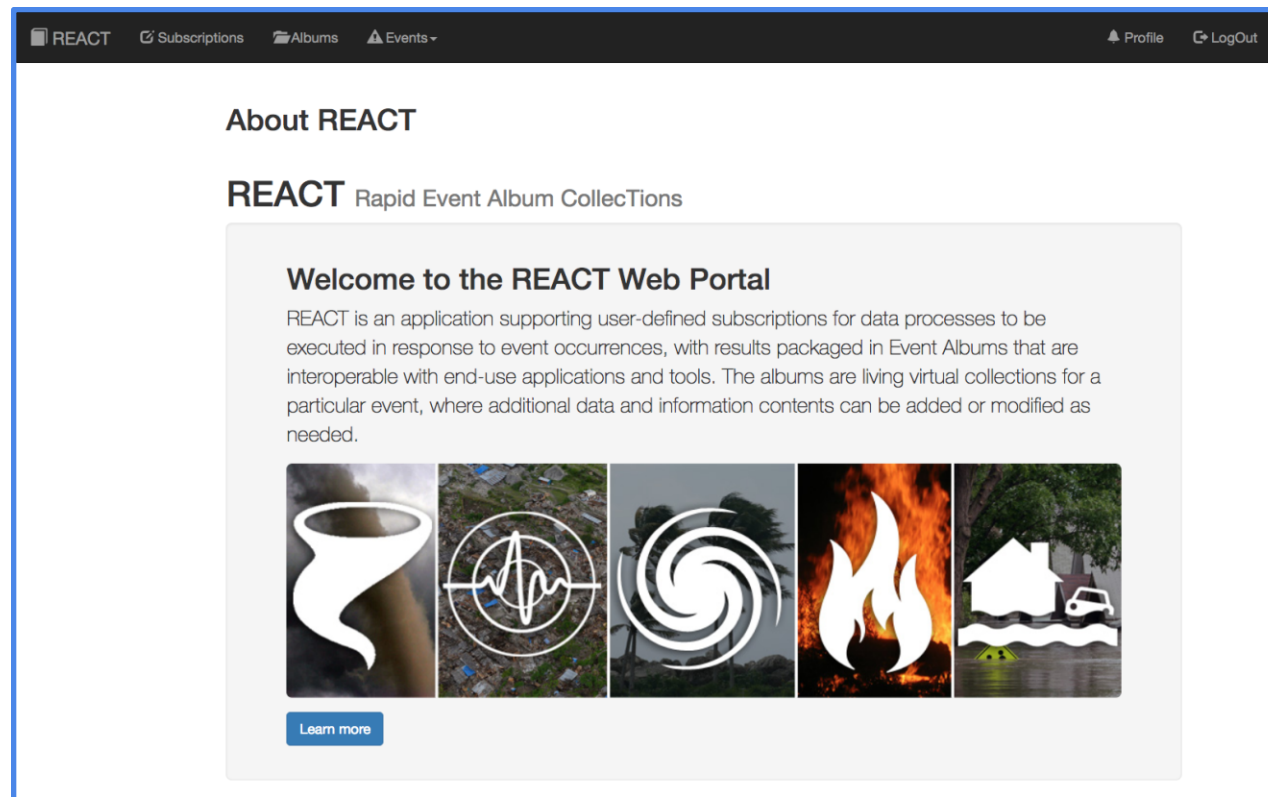
Can be manually triggered by a user or application can function as a listener



# Example REACT Portal



Prototype web application developed as part of the funded ED3 project





# REACT Interface



REACT Subscriptions Albums Events Profile LogOut

Welcome keiser !

Earthquake Hurricane [Add a New Subscription](#)

### Earthquake

Show 10 entries Search:

Index	Subscription Name	Subscription Last Modified	Subscription Matched on	Magnitude	Location	Active	Update	Action
1	Earthquake 1	12/Jul/2017 12:02:58		4.0	-90,90,-180,180	False	<a href="#">Update</a>	
2	Earthquake 2	11/Jul/2017 13:27:33	27/Sep/2017 23:16:19	3.0	50, 30, -130, -60	True	<a href="#">Update</a>	
3	Earthquake 3	12/Jul/2017 12:02:10	27/Sep/2017 23:21:19	3	-90,90,-180,180	True	<a href="#">Update</a>	
4	Earthquake 4	26/Jul/2017 07:42:06	26/Sep/2017 23:35:37	5	-90,90,-180,180	True	<a href="#">Update</a>	

Showing 1 to 4 of 4 entries Previous 1 Next



# REACT Interface

REACT Subscriptions Albums Events Profile LogOut

Show 10 entries

Search:

Event Type	Description	Event Title	Matched by Subscription	Date	Info	Action
Earthquake	<a href="https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avqw.geojson">https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avqw.geojson</a>	M 3.2 - 14km NW of Harper, Kansas	Earthquake 2	2017-Sep-27 23:56:54	<a href="#">Details</a>	
Earthquake	<a href="https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avqw.geojson">https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avqw.geojson</a>	M 3.2 - 14km NW of Harper, Kansas	Earthquake 3	2017-Sep-27 23:56:54	<a href="#">Details</a>	
Earthquake	<a href="https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avr2.geojson">https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avr2.geojson</a>	M 4.9 - 111km SSW of Kokopo, Papua New Guinea	Earthquake 3	2017-Sep-27 23:56:28	<a href="#">Details</a>	
Earthquake	<a href="https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avq4.geojson">https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avq4.geojson</a>	M 3.4 - 8km N of Cot, Costa Rica	Earthquake 3	2017-Sep-27 21:41:56	<a href="#">Details</a>	
Earthquake	<a href="https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avn9.geojson">https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avn9.geojson</a>	M 4.2 - 38km N of Komodo, Indonesia	Earthquake 3	2017-Sep-27 19:30:04	<a href="#">Details</a>	
Earthquake	<a href="https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avlw.geojson">https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avlw.geojson</a>	M 4.5 - 75km NE of Yonakuni	Earthquake 3	2017-Sep-27 17:56:39	<a href="#">Details</a>	





# REACT Interface



REACT Subscriptions Albums Events Profile LogOut

## Event Data

Magnitude = 3.2

Detail = <https://earthquake.usgs.gov/earthquakes/feed/v1.0/detail/us2000avqw.geojson>

Place = 14km NW of Harper, Kansas

Time = 2017-Sep-27 23:56:54

Url = <https://earthquake.usgs.gov/earthquakes/eventpage/us2000avqw>

### Export the Data

GeoJSON

Export

### Fema National Flood Hazards

<http://hazards.fema.gov/gis/nfhl/rest/services/public/NFHL/MapServer>

### Noaa Social Vulnerability Index Census Block

[https://coast.noaa.gov/arcgis/rest/services/sovi/sovi\\_blockgroups/MapServer](https://coast.noaa.gov/arcgis/rest/services/sovi/sovi_blockgroups/MapServer)

### National Digital Forecast Database

[https://idpgis.ncep.noaa.gov/arcgis/rest/services/NWS\\_Forecasts\\_Guidance\\_Warnings/NDFD\\_temp/MapServer](https://idpgis.ncep.noaa.gov/arcgis/rest/services/NWS_Forecasts_Guidance_Warnings/NDFD_temp/MapServer)



# REACT Interface



REACT Subscriptions Albums **Events** Profile LogOut


## Disaster Events

### Currently Available Disaster Events

REACT currently provides a subscription service for the following disaster events.

- Earthquakes
- Tropical Storms and Hurricanes
- Floods

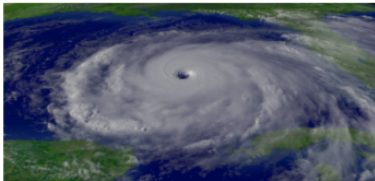
These subscriptions allow registered users to establish a set of disaster event related criteria that when satisfied will trigger notifications, data collections, and data processes. Results will be collected in the form of Event Albums, which can be used by researchers, disaster response personnel, and decision makers to monitor disaster events throughout the world.



#### Earthquakes

An earthquake is the shaking of the Earth surface, resulting from the sudden release of energy in the Earth's lithosphere creating seismic waves. Strong earthquakes can cause property damage, injuries, and loss of human life. Monitoring stations around the globe use seismometers to detect, locate, and estimate their magnitude. REACT provides a subscription service that will trigger data collections when a set of user defined criteria is achieved such as location and magnitude.


[Subscribe](#) [View Albums](#)



#### Tropical Storms and Hurricanes

Tropical Storms and Hurricanes are huge storms. A tropical storm has sustained wind speeds of at least 39 miles (63 km) an hour. When wind speeds reach 74 miles (119 km) an hour it becomes a hurricane and earns a category rating of 1 to 5 on the Saffir-Simpson scale. REACT provides a subscription service that will trigger data collections when a set of user defined criteria is achieved such as wind speed and location.

[Subscribe](#) [View Albums](#)



#### Floods

A flood is an overflow or covering of water that submerges land that is usually not covered by water. Floods often cause damage to homes and businesses if they are in the natural flood plains of rivers. Some floods develop slowly, while others such as flash floods, can develop in just a few minutes and without warning. REACT provides a subscription service that will trigger data collections when a set of user defined criteria is achieved such as flood forecasting, flood warnings, rainfall levels, and location.

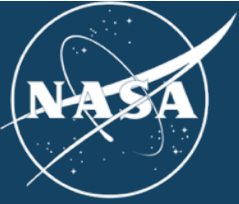
[Subscribe](#) [View Albums](#)

There is no consistency in format across organizations for alerts or warnings

A common alert protocol (CAP) is available but not many agencies use it

Therefore, event types must be set up by system engineers individually

Users can not specify an event of choice that is not already available



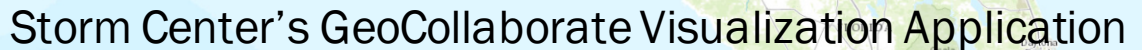

# Use Case: Automated Event Packages



## Automatically generate media packages for major weather events

- Often when there is a major weather event, NASA PR folks ask for **media-friendly items** showcasing how NASA-funded activities can help society respond to the event. The general response seems to be a lot of scrambling to find relevant items. By having an event-based subscription that already pulls together the **subscribed resources**, GHRC can provide the requested material sooner.
- As better resources are identified, they can be added to the existing subscriptions, improving delivered package over time.
- Can also incorporate generated package into the GHRC web site workflow, so that the material can be publicly distributed.
- Customer: GHRC Outreach Team
- Event Types: Major weather events such as hurricanes, severe storms, catastrophic lightning, etc
- Data Products: varied
- Entry point: GHRC admin interface for setting up subscriptions

**This is one example of curated use. This is not the only way to use REACT. The application can also be used by individual scientists to create unique albums that they can publish and share with others**



- Storm center created a REACT tornado subscription with a trigger of NWS tornado warning
- The subscription collected/filtered social media in the defined space and time and created a tornado event album (using GeoRSS xml)
- Storm center monitored the GeoRSS feed and plotted the data in their application



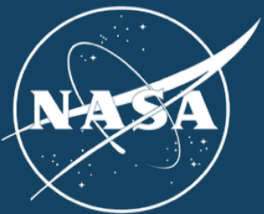
# Questions

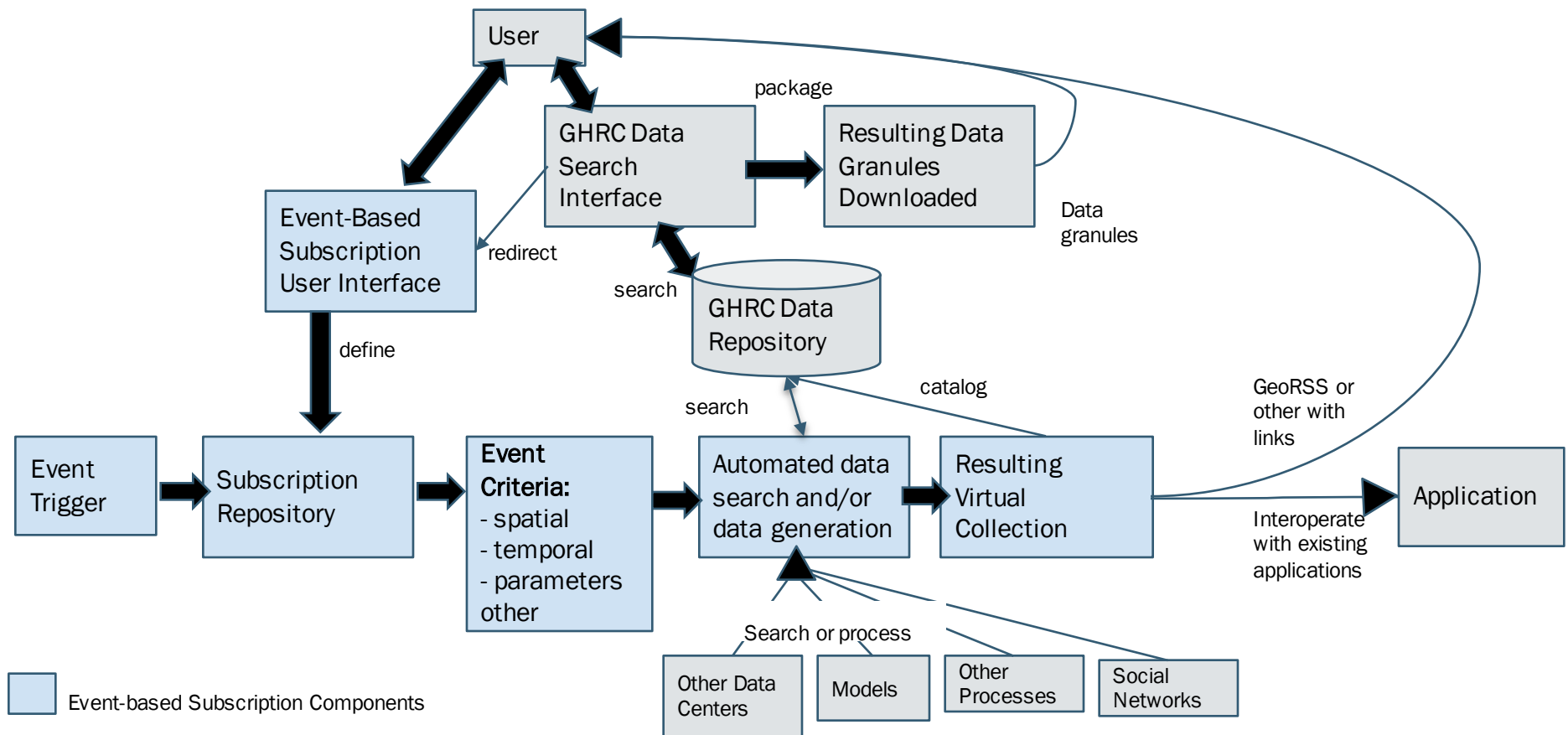


- Is this type of capability what you were thinking of when you recommended event-based data delivery for GHRC?
- Do you think REACT is a useful capability for GHRC users?
- Should REACT be provided as an auto-generated curated offering of event data albums (virtual collections) or with full adaptable capability for scientist use?
- GHRC could implement such a tool in phases: a curated album or two the first year, scientist specification of select albums the second year, full capability in the third year. Expand the functionality as interest grows among users. If no measureable interest, stop. Would this be satisfactory?
- The level of effort needed to integrate and deploy such capability at GHRC would need additional funding. Does the UWG feel strongly enough to recommend it as a priority for GHRC development efforts?

# THANK YOU!

Questions?









*(Future: Suggesting event-based subscription for search users based on behavior)*

- **Track user's navigation / filtering actions** in order to find data
  - Facet-based searching
  - Always show a breadcrumb-style navigation menu
- Once the search narrows down to a manageable data size (total bytes? total files?), then begin showing **visual indicators for data subscriptions**
- When a user chooses to subscribe to data, **start with a simple subscription**
  - Simple subscription = simple selection criteria + list of actions
  - Simple selection criteria = specific datasets + geographic bounds (+ time?)
- **Present existing virtual collections** (as a set of selection criteria) + list of actions
- **Redirect to event-based subscription** - show candidate events (hurricanes, severe weather, flooding) that overlap the search
  - To be used as start of event-based subscription
  - Event-based subscription = event criteria + list of virtual collections + list of actions





- While search for data in the GHRC system, the user is presented with event information coincident with their spatial/temporal searches and asked if they would like **additional data/information related to that (and similar) events**. The user could then be referred to the event-based subscription interface (along with current spatial/temporal settings) where they could complete a subscription request.
- Customer: anyone
- Event Types: any currently configured in the system to allow for coincidence with users searches.
- Data products: NASA science data, any other products (models, etc) that can be generated based on an event occurrence, relevant social media content, research analyses
- Entry point: GHRC data search - then redirected to event-based subscription interface